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IS 13931-2 (1993): Automotive vehicles - Stoplight switches, Part 2: Methods of test [TED 11: Automotive Electrical Equipment]

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स्वचल वाहन — बत्ती बन्द करने के स्विच

भाग 2 परीक्षण पद्धति

Indian Standard

AUTOMOTIVE VEHICLES — STOPLIGHT SWITCHES

PART 2 METHODS OF TEST

UDC 629·113·066 : 621·316·5

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1993 Price Group 2

Automotive Electrical Equipment Sectional Committee, TED 11

FOREWORD

This Indian Standard (Part 2) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Electrical Equipment Sectional Committee had been approved by the Transport Engineering Division Council.

This is one in the series of Indian Standards for automotive switches. This Indian Standard is also based on the current practices followed by the industry.

The other part of this standard is IS 13931 (Part 1) : 1993 'Automotive vehicles — stoplight switches : Part 1 Specification'.

IS 4373 : 1967 'Hydraulically operated stoplight switches' is also an important adjunct to this Indian Standard.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

AMENDMENT NO. 1 SEPTEMBER 2006
TO
IS 13931(PART 2) : 1993 AUTOMOTIVE VEHICLES — STOPLIGHT SWITCHES

PART 2 METHODS OF TEST

(*Page* 3, *clause* **4.12**, *first sentence*) — Substitute the following for the existing.

'The switch shall be tested for 500 000 cycles of operation at designated electrical load with at least 80 percent of rated current at normal temperature (Room temperature between 20°C to 40°C) with the stroke not exceeding 4 mm.'

(TED 11)

Reprography Unit, BIS, New Delhi, India

Indian Standard

AUTOMOTIVE VEHICLES — STOPLIGHT SWITCHES

PART 2 METHODS OF TEST

1 SCOPE

This standard (Part 2) covers the methods of test for mechanically operated stoplight switches used in automotive vehicles operated either on 12 V or 24 system. This standard is not applicable to two wheelers. The general requirements have been specified in Part 1 of this standard.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
9000 (Part 16) : 1983	Basic environmental testing procedures or electronic and electrical item : Part 16 Driving rain test
10250 : 1982	Specification for severities for environmental tests for automotive electrical equipment

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Type Tests

Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of stoplight switch.

3.2 Routine Tests

Tests carried out on each stoplight switch to check requirements which are likely to vary during production.

3.3 Acceptance Tests

Tests carried out on each samples taken from a lot for the purpose of acceptance of the lot.

4 TESTS

4.1 Classification of Tests

4.1.1 *Type Tests*

The following shall constitute type tests:

a) Performance test:
  i) Operating force
  ii) Working stroke

b) Static load tests:
  i) Mechanical strength test
  ii) Strength of terminals test
  iii) Terminal actuator test
  iv) Drop (free fall) test

c) Endurance test

d) Vibration test

e) Environmental tests:
  i) Cold test
  ii) Low temperature test
  iii) Dry heat test
  iv) Damp heat test
  v) Water spray test
  vi) Salt spray test
  vii) Dust test
  viii) Contamination test
  ix) Corrosion resistance test

f) Insulation resistance test (for metallic switches)

g) High voltage test

h) Voltage drop test

j) High current test

k) Continuous operation test

m) Driving rain test

4.1.2 *Acceptance Tests*

The acceptance tests shall constitute:

a) Visual examination

b) Dimensional check up

c) Performance test

d) Insulation resistance test

e) Test for voltage drop

4.1.3 *Routine Tests*

The following shall constitute routine tests:

a) Visual examination

b) Dimensional checks

c) Performance test

d) Insulation resistance test (for metallic switches)

4.1.4 *Criteria for Approval*

Ten samples of stoplight switches shall comply with the requirements of tests given in **4.1.1.**

4.1.4.1 In case of failure of one or more type tests, the testing authority may call for fresh samples not exceeding twice the number of earlier samples and subject them to the test in which failure occurred. If in repeated test, no failure occurs, the test may be considered to have been satisfactory. A typical sequence of tests is given in Table 1.

4.2 Visual Examination

The switches shall be examined for finish and proper assembly and shall be free from injurious flaws or other defects.

4.3 Dimensional Checks

The switches shall be checked for dimensional requirements as per mutual agreement between the manufacturers and the suppliers.

4.4 Performance Test

4.4.1 *Operating Force Test*

The operating force of the switch shall be between 3 to 15 N (0'3 to 1'5 kgf) for a 2 ± 1 mm of plunger movement stroke.

4.4.2 *Working Stroke Test*

The switch shall be designed in such a manner that switch will become 'ON' and the contact shall remain closed after push rod of the switch

Table 1 Typical Sequence of Tests

(*Clause* 4.1.4.1)

Test	Sequence									
	1	2	3	4	5	6	7	8	9	10
1. Visual examination	X	X	X	X	X	X	X	X	X	X
2. Dimensional check up	X	X	X	X	X	X	X	X	X	X
3. Performance test	X	X	X	X	X	X	X	X	X	X
4. Test for voltage drop	X	X	X	X	X	X	X	X	X	X
5. Insulation resistance	X	X	X	X	X	X	X	X	X	X
6. High voltage	X	X	X	X	X	X	X	X	X	X
7. Mechanical strength			X							
8. Strength of terminals	X	X								
9. Terminal actuator test	X	X								
10. Drop (free fall) test		X	X							
11. Endurance test			X	X	X					
12. Vibration test						X				
13. Test for water spray							X			
14. Test for salt spray								X		
15. Dry heat test									X	
16. Damp heat									X	
17. Dust								X		
18. Cold test										X
19. Low temperature test										X
20. Contamination test		X								
21. Corrosion resistance test		X								
22. High current			X							
23. Continuous operation			X							
24. Driving rain									X	

is moved by 2 ± 1 mm and shall remain open for the remaining travel till the tip of the plunger has covered maximum travel. The full stroke of the push rod shall be 6 to 10 mm.

4.5 Test for Voltage Drop

A rated load current is applied across the switch terminals; the voltage drop measured across the terminals shall not exceed the following:

a) Before the endurance test	80 mv
b) After the endurance test	120 mv

The test shall be conducted at rated voltage.

NOTE — The switch shall be cycled manually for minimum ten cycles to ensure proper working of the switch at designed electrical load.

4.6 Insulation Resistance Test

With switch 'OFF' conditions insulation resistance between insulated terminals and between terminal and body, measured with dc voltage of 500 V applied at normal atmospheric conditions.

4.7 High Voltage (Flash) Test

The stoplight switch shall be subjected to a flash test with 240 V a.c. rms for 5 seconds at any available supply frequency between 40 to 60 Hz, applied between each of the terminal and the main body conditions.

The switch shall withstand this test without arcing or puncture of the dielectric material.

4.8 Test for Mechanical Strength

4.8.1 A force of 200 N shall be applied to the stoplight switch for one minute for checking its mechanical strength against accidental sudden high forces.

4.8.2 The stoplight switch shall also be operated with a maximum force of 100 N for 1 000 operations to ensure its mechanical strength.

4.8.3 After the test for mechanical strength, the switch shall be subjected to test for voltage drop.

4.9 Strength of Terminals

A static load of 50 N (5 kgf) shall be applied on the fixing parts of terminals for a period of one minute. The switch shall be observed for any harmful deformation or abnormalities. The load application shall be in the direction of terminals.

4.10 Terminal Actuator Test

The stoplight switch shall be tested under the following conditions:

a) The connector and connector housing shall be connected and disconnected ten times. A static load of 200 N (20 kgf) for one minute shall be applied on the plunger in the direction of actuation.

b) At the end of the test, the terminals shall not have any deformation and play at the fixing points of the terminations. The stoplight switch then shall pass the tests in **4.4** and **4.5**.

4.11 Drop (Free Fall) Test

This test shall be carried out according to **4.10** of IS 10250 : 1982. The number of falls may, however, be 50.

After the test, the switch shall be examined and there shall be no physical damage or deformation. The switch shall also meet the requirements of tests given in **4.4** and **4.5**.

4.12 Endurance Test

The switch shall be tested for 5 00 000 cycles of operation at designated electrical load at normal temperature with the stroke not exceeding 4 mm. The test voltage shall be 14 V and 28 V in case of rated voltage of 12 V and 24 V respectively. The frequency of operation shall be between 25 ± 5 cycles/min. At the end of the test, the switch shall be observed for free movement of plunger and play. The switch shall be tested for performance and voltage drop test.

4.13 Vibration Test

The stoplight switch mounted on a suitable support shall be kept in vibration, in simple harmonic motion, at the rate of 10-55-10 Hz, continuously varying in a period of one minute and with a total lift of 1·5 mm, for one hour in each of the three major axis of the assembly. At the end of the test, switch shall be tested for voltage drop.

4.14 Test for Water Spray

The test shall be conducted in accordance with **4.13** of IS 10250 : 1982 as applicable to group 2 equipment.

4.14.1 The stoplight switch, after the test, shall satisfy the requirements of test for voltage drop (*see* **4.5**) and insulation resistance test (*see* **4.6**).

4.15 Test for Salt Spray

The test for salt spray on stoplight switch shall be conducted in accordance with Appendix A of IS 10250 : 1982.

4.15.1 The stoplight switch, after the test, shall be tested for requirements of test for voltage drop (*see* **4.5**) and insulation resistance test (*see* **4.6**).

4.16 Dry Heat Test

The test shall be conducted in accordance with **4.2** of IS 10250 : 1982 as applicable to group 2 equipment.

4.16.1 After the test the stoplight switch shall be examined for any crack or distortion of shape and shall be tested the requirement of test for voltage drop.

4.17 Damp Heat Test

The test shall be conducted according to **4.3** of IS 10250 : 1982. The number of conditioning cycles and recovery period as applicable for group 2 shall be followed:

Temperature	55°C ± 2°C
Relative humidity	90 to 95 percent
Duration	7 days

After completion of the test, the stoplight switch shall meet the requirements of the test **4.5** and **4.7**.

4.18 Dust Test

The test shall be conducted according to **4.6** of IS 10250 : 1982 and after the tests, checked for performance and voltage drop tests.

4.19 Cold Test

The test shall be conducted according to **4.4** of IS 10250 : 1982. After the test, visual examination and voltage drop test to be carried out.

4.19.1 *Low Temperature Test*

When agreed between the purchaser and the supplier this test shall be conducted under the following conditions:

Temperature	−30°C ± 3°C
Duration	2 hours

After the test, visual examination and voltage drop tests to be carried out.

4.20 Contamination Resistance Test

The test shall be conducted in accordance with **4.9** of IS 10250 : 1982.

The stoplight switch shall be sprayed with contaminants like diesel, petrol, thinner, lubricant oil and brake fluid. The stoplight switch shall neither react with nor dissolve in the contaminants.

4.21 Corrosion Resistance Test

The test shall be conducted according to **4.8** of IS 10250 : 1982 for 150 hours consisting of 6 cycles of each 24 hours exposure with one hour drain period.

After completion of the test, the sample shall not show any sign of corrosion and shall meet the requirements of test given in **4.4** and **4.5**.

4.22 High Current Test

A high current of 25 A is passed through the stoplight switch along with vehicle fuse for one minute, and examined for any sign of failure. The voltage drop shall be measured after the test.

4.23 Continuous Operation Test

The stoplight switch shall be connected to the rated load with switch 'ON' for a period of 30 min.

4.23.1 After this period, the switch shall be tested for voltage drop (*see* **4.5**) and performance requirements (*see* **4.4**).

4.24 Driving Rain Test

The test shall be conducted according to IS 9000 (Part 16) : 1983 under the following conditions:

Test condition	A
Duration	2 hours

After completion of the test, the stoplight switch shall be tested for performance and voltage drop.

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